DOCUMENT RESUME

ED 309 165 SP 031 319

AUTHOR Russell, Tom
TITLE The Roles of Research Knowledge and Knowing-in-Action in Teachers' Development of Professional Knowledge.
PUB DATE Mar 89
NOTE 16p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, CA, March 27-31, 1989). For related documents, see SP 031 317-318.
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Beginning Teachers; Cognitive Structures; Critical Thinking; Elementary Secondary Education; *Experiential Learning; Foreign Countries; Learning Processes; *Professional Development; *Research Utilization; Teacher Attitudes; *Theory Practice Relationship

ABSTRACT

This paper examines how teachers develop and modify professional knowledge in response to experience and to new research knowledge. A discussion is presented on the interaction of propositional knowledge (the basic medium of classroom and research knowledge) and practical knowledge (the observable competence apparent in successful professional actions). Alternative definitions of professional expertise are examined prior to taking a close look at the issue of learning from experience, using data provided by several of the teachers who participated in the study. An analysis of how teachers learn from experience takes into consideration four broad principals of expertise: discrete technical skills, application of theory or general principles, critical analysis, and deliberate action. Summaries are presented of interviews with five teachers, of whom one was a preservice teacher, two were beginning teachers, and two were experienced teachers with Master of Education degrees. Data selected from the interviews suggest that there are tensions associated with the differences between research knowledge and practical knowledge and that this is a significant problem for beginning teachers. (JD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED309165

THE ROLES OF RESEARCH KNOWLEDGE AND KNOWING-IN-ACTION IN TEACHERS' DEVELOPMENT OF PROFESSIONAL KNOWLEDGE

Tom Russell

SP031 319

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

T. Russell

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

THE ROLES OF RESEARCH KNOWLEDGE AND KNOWING-IN-ACTION IN TEACHERS' DEVELOPMENT OF PROFESSIONAL KNOWLEDGE[1]

Tom Russell
Faculty of Education, Queen's University
Kingston, Ontario K7L 3N6

Introduction[2]

This paper is concerned with how research knowledge and the practical knowledge implicit in actions contribute separately and in interaction to the development of professional knowledge by teachers. The basic premise of the paper is that the contribution is not well understood, and that further progress in teacher education requires that we improve our understanding of how teachers develop and modify professional knowledge in response to experience and to new research knowledge. A number of issues relate to this broad topic, and some are apparent in the following questions.

- Why do beginning teachers find it so difficult to put theory into practice?
- Why are beginning teachers so excited about practice teaching experiences and so frustrated by the apparent inadequacies of education courses?
- Why do experienced teachers seem to have only a vague understanding of how they learned to teach? And why do they find it so difficult to tell others how they learned to teach?
- Why do teachers seem to have so little confidence in their classroom practices and in the adequacy of their professional knowledge?
- Why do teacher educators find it difficult to make research findings meaningful to beginning teachers?
- How does a teacher learn from experiences of teaching?

These questions express a view of the present state of teacher education programs and activities, just as they also indicate specific issues concerning the development

---

[1] Presented at the meeting of the American Educational Research Association, San Francisco, March, 1989.

[2] The work described here is from the research project "Metaphor, Reflection, and Teachers' Professional Knowledge," directed by Hugh Munby and Tom Russell, and funded by the Social Sciences and Humanities Research Council of Canada. Additional support has been provided by the School of Graduate Studies and Research at Queen's University. BITNET address: RUSSELLT@QUCDN

SP031 319

of teachers' professional knowledge. It is not assumed that all teacher educators see these questions as valid or crucial, but it is seen as important to use the questions to indicate the domain and basic premises of the argument that follows.

This paper is also driven by four years of research on the development of professional knowledge by beginning and experienced teachers, research guided by the arguments about professional knowledge advanced by Schön (1983). Schön attributes many of his perspectives to Dewey, and it may be that one of Schön's major achievements is the updating and reissuing of Dewey's challenges to those who prepare professionals for their future work. At the same time, Schön's arguments, like Dewey's, are complex and open to multiple interpretations.

Our research at Queen's University has involved more than 20 teachers, with varying degrees of experience. Many were beginning teachers, several of whom have been followed into their early years of teaching. Several other participants have 10 to 15 years of experience. Schön's (1983) arguments about knowing-in-action and reflection-in-action prompted us to observe and interview teachers at regular intervals to assemble detailed accounts of how they see their practices and their development of professional knowledge. At the same time, the research activities themselves constituted sequences of actions that enabled us to refine our own understanding of Schön's (1983, 1987) positions (Munby & Russell, 1989). The interview data were analyzed from the perspectives of metaphor and reflection (Russell & Johnston, 1988; Russell, Munby, Spafford, and Johnston, 1988).

This paper begins with a discussion of the tension between propositional knowledge (the basic medium of classrooms and of research knowledge) and practical knowledge (the observable competence apparent in successful professional actions). Alternative definitions of professional expertise are examined prior to taking a closer look at the issue of learning from experience, using data provided by several of the teachers who have participated in our research. The two themes of greatest interest can be expressed as questions, including one from the list presented above:

- How does a teacher learn from experiences of teaching?

- How does a teacher come to understand how professional knowledge develops in relation to research and personal experience?

Research Knowledge and Knowing-in-Action

Propositional knowledge related to teaching ranges from maxims such as "Don't smile until Christmas" to the most recent reports of research on teaching. (*Educator's Handbook: A Research Perspective* [Richardson-Koehler, 1987] is one excellent summary of such research.) Research knowledge expressed in propositions is one source of pressure on teachers to examine their teaching with a view to improving it. Knowing-in-action is Schön's term for the knowledge

(know-how) that is apparent **in** actions (rather than in propositions). Teachers tend to be aware that what they know how to do (practical knowledge) well can be very hard to express in words. Teacher educators, those who supervise beginning and experienced teachers, and those who receive students teachers into their classrooms are all aware that the propositions we use to talk about teaching do not and apparently **cannot** transfer propositional or research knowledge to another person in a way that is readily apparent as knowing-**in-action.**

Our use of language suggests that the problem is long-standing and deeply rooted: We learn theory, but we learn **to** teach. We speak of putting theory **into** practice, but detailed accounts of such events are rare. We may say that practice is **guided by** theory, a term that recognizes the gap between thoughts and beliefs on the one hand and actions on the other. We **have** experiences, and we hope to learn **from** experience or **by** experience, but we do not **learn** experience. And those who work with beginning teachers know that some do better--both in speed and in quality--than others, in terms of learning from experience.

The significance of the issue of how research knowledge and experience separately and jointly contribute to professional expertise is also signalled by statements such as the one made by Feiman-Nemser and Floden (1986, p. 512): "Teachers have not been seen as possessing a unique body of professional knowledge and expertise. The prevailing view among most researchers is that teachers have experience while academics have knowledge." When Fenstermacher (1986) suggested that the gap between research and practice may be bridged through analysis of teachers' "practical arguments," his position attracted considerable attention. A recent issue of *Educational Theory* reports six analyses of Fenstermacher's initial position, providing considerable insight into the complexities of the research-practice gap ("Symposium," 1987).

Schön (1983) directs attention to reflection-in-action as a key to the development of knowing-in-action, and we have worked to discover the meanings of that term. Schön talks about frame awareness--our awareness of the frames we put on our experiences--and he places considerable emphasis on the process of reframing of experience. It is here that metaphor comes into the analysis (see also Munby, 1986), with reframing referring to a new way of looking at experience. Schön distinguishes between feedback and backtalk, with the former referring to expected messages back from our clients and the latter referring to unexpected, surprising or puzzling messages back from the situation in which we are acting. Feedback confirms existing frames for experience, while backtalk may lead to new ways of seeing the situation, to reframing of experiences. It is here that Schön applies his delightful phrase, "a reflective conversation with the materials of the situation."

To return briefly to the category of propositional knowledge, whether maxims and tips, theories, or research knowledge, propositions can serve as frames for experience. We are aware of these frames when we read about them and discuss them in classes, but we often have difficulty relating them to our actions. (Psychologists must have a great deal to offer on this topic of transfer of training.

We all too often realize after a problem situation has passed that we failed to think of something we knew in another context that would have been helpful.) Gradually, we may gain greater insights into the meaning of propositions as we succeed in relating them to experience, but it is often a long, slow, painstaking process. Also, it is important to note that this construction of meaning can be applied not only to learning to teach but also to the learning that teachers ask children to do in classrooms.

In contrast to propositional knowledge, experience often has richness and immediacy that are exciting while the events last. Science teachers know the enthusiasm students can show for laboratory work, but they also know that guided experiences with equipment do not translate directly into new propositional knowledge of scientific laws. One point that seems crucial at this stage is what we do, and what we expect our students to do, when they encounter backtalk--unexpected ways of looking at or thinking about a situation in which they are acting. Schön is certainly not suggesting that all reframing is productive, for he goes to great length to discuss the processes by which a professional may evaluate new frames **in** action, to determine if they represent an increment in professional knowledge. In the context of teacher education and development, do individuals attend to backtalk, which may lead to productive reframing, or have they learned (over many years of schooling that emphasized propositional knowledge) to ignore and regard as unimportant the unexpected messages from the situation?

Alternative Definitions of Professional Expertise

The discussion to this point indicates some of the difficulties associated with our efforts to understand the development of professional knowledge by teachers. We say that beginning teachers learn from experience, but such learning is not easily described in words, nor is it clear how professional programs housed in universities facilitate learning from experience. Building on the ideas of Dewey, Schön (1983) has reminded us of this awkward state of affairs in professional education generally. Kennedy (1987) makes a very helpful contribution to the analysis of professional education by extracting definitions of expertise from the literature of various programs across the professions. Her findings are summarized in four broad definitions of expertise: discrete technical skills, application of theory or general principles, critical analysis, and deliberate action. The following summary of Kennedy's discussion blends her definitions of expertise (pp. 134-152) with her discussion of different traditions in supervised practice arrangements for those who are developing professional expertise (pp. 153-161).

1. The **technical skills** definition, familiar in teacher education, lends itself to developing expertise in a sequence in which information is followed by lab practice, followed in turn by coaching in real settings. (This approach parallels the tell-practice-test sequence often criticized by those who would improve classroom teaching.)
2. Casting expertise as the **application of theory or general principles** invokes the familiar hierarchy of general principles, then rules for

application to practice, followed by practice itself. This view puts practices in broader perspective and gives practice in applying principles to real settings.

3. Law and business are two professions in which expertise may be described in terms of **critical analysis**. What trainees learn are not solutions to problems but ways to analyze and interpret problems; as a result, the transfer of what one learns to practice is seen as automatic.
4. Finally, defining expertise as **deliberate action** suggests "an interactive relationship between analysis and action, such that each influences the other. This view assumes that expertise evolves and develops with experience, but that experience can only contribute to expertise if practitioners are capable of learning from it." (Kennedy, 1987, p. 148). Corresponding roles are assigned to practical experiences, which may be scheduled before as well as during the introduction of theory.

As Kennedy notes, pre-service teacher education often emphasizes the development of technical skills. The application of theory or general principles is also familiar. Practice teaching assignments are referred to as the settings in which theories and principles taught in education courses may be applied. Yet student teachers rarely have enough control to feel that they may practice and test their own ideas, and the extent of supervision by the people who presented the theories and principles is usually very limited and hence of little assistance to the beginner. The view of expertise as deliberate action raises several significant issues for teacher educators. A truly interactive relationship between analysis and action "such that each influences the other" is an attractive image, yet we lack the financial resources and the experiences required to design and operate programs based on this image. In addition, the deliberate action view raises the issue of ability to learn from experience: Why do some learn rapidly and others very slowly? Can the rate of learning from experience be improved? What is the impact of experience on educational theories and principles, and on specific technical skills practiced in simulated settings? How does learning from experience change over a teacher's entire career?

Kennedy's placement of Schön's position in the deliberate action view of expertise helps us to see why those who have been interested in how Schön's ideas may be related to teacher education seem to interpret his work in so many different ways. If there are fundamental differences between Schön's assumptions about expertise and the most familiar working assumptions of our present programs, then multiple and conflicting interpretations are virtually inevitable. Fenstermacher's (1986) position is less easily located, but could be interpreted as an effort to bridge between the application of theory and principles view and the deliberate action view. How Fenstermacher's practical arguments are to be influenced by action and tested in action is not clear.

Learning from Experience

Given that it is possible for a university graduate with no formal teacher education to perform a teacher's duties in a classroom, one may assume that some learning about teaching occurs by observation of teachers.[3] Those who work with infants and young children know that modelling is a very powerful learning strategy. We also know that we learn by working with propositional knowledge. Kennedy's analysis of definitions of expertise helps us see that Schön's attention to reflection-in-action as a process of developing expertise is directed at gaining deliberate control over professional actions **and** at learning from experience at a level at which research knowledge can be related to the analysis of actions.

Participants in our recent studies have shown us a variety of attitudes toward learning from experience and learning by listening, reading and discussion (of theories, principles, and research knowledge). Our broadest impression is that pre-service and beginning teachers are confused and disappointed by the difficulties of relating experience and theory to each other and to future practices. We have also been fortunate to work with several experienced teachers who could describe clearly their learning from experience and the impact of graduate study on their practices. One teacher seemed particularly successful in combining learning from experience with learning from research to develop a set of interrelated teaching strategies that were consistent with each other and with his personal goals as a teacher. The data that follow have been selected to illustrate these issues. We have begun to draw the conclusion that pre-service teacher education needs to develop strategies to open up for beginning teachers the ways we learn from experience and strategies we may use to gain greater awareness of and control over that mode of professional learning.

Our data collection has relied heavily on interviews immediately after observation of teaching. The interviewer draws on the observation and on themes in earlier interviews to inquire further into the teacher's professional knowledge. Excerpts are selected from interviews with five teachers; Ann is in her pre-service year, Nancy and Wendy are first-year teachers, and Diane and Roger are experienced teachers who have completed Master of Education degrees.[4] Italicized statements are ones made by an interviewer.

---

[3] There were periods when the Peace Corps and CUSO (Canadian University Service Overseas) sent untrained graduates to teach in developing countries, perhaps on the assumption that an untrained teacher was better than none at all. My own teaching career began that way in Nigeria, in the 1960s.

[4] Detailed accounts of Nancy, Wendy, Diane, and Roger, from the perspectives of metaphor and reflection, are presented in Russell & Johnston (1988).

Ann[5]

Ann participated in our study during her pre-service program. From the following quotation, we see that her practice teaching experiences have introduced her to the tension between covering curriculum content and doing the things that professors tell her are important if children are to understand what she teaches.

> [One professor] has a lot of ideas of motivational techniques and little things to play with and make it real. I really question whether you can do that on a day-to-day basis and still get the material covered. The same thing with [two other professors]; it's nice to have all these demonstrations and toys and games, but are you actually going to get the material covered? I was at a department meeting here, and one man actually stood up and said, "Well, according to the guidelines, I'm three units behind." The new guidelines actually say what you are supposed to do if you're using all these things. You're going to be sacrificing something, and it's going to be content. I think that is a contradiction. They should bring these a little more down to earth for us in the sense of practical terms, the things we are going to be faced with.

The pre-service teacher cannot understand fully what is expected of a first-year teacher. In a study of student teachers' planning and reflections, Borko, Livingston, McCaleb, and Mauro (1988, p. 77) have reported that three of six student teachers in a traditional program tended not to see themselves "as responsible for, and in control of, classroom events." In practice teaching, the process of learning from experience seems to be at a preliminary stage, perhaps sheltered by the rules of the practicum experience. Stronger statements come from Nancy and Wendy, during the first year of teaching.

Nancy

Nancy participated in our study during her pre-service program and continued during her first year of teaching, at the Grade 2 level. She suggests that her initial teaching is guided by what she learned from experienced teachers during practice teaching, and she criticizes the content of her pre-service program.

> As a beginning teacher, you're just trying to get through the curriculum. You need to establish your rules, you have to set your routine, things that I think I learned [last year] from talking to teachers. . . .

---

[5] This and a number of other statements by pre-service and first-year teachers on the topic of theory and practice are discussed in Russell (1988).

> [At the Faculty of Education] they emphasized things that I don't think needed to be emphasized and instead left out the important nitty-gritty stuff. Yet I look back at the things I did [last year] and I wonder how much I really am going to use--not a lot. In one course we were given all these questions to ask about evaluating but [the professor] didn't give us any concrete things about how we should write a report card, and how detailed it should be.

Nancy goes on to explain that her learning is focussed on how children think and what they can do. She indicates that she has not yet understood how general principles relate to practice, and she shows that her first loyalty is not to theory but to the children she teaches.

> Like right now I'm learning what a Grade 2--how they think. I don't know how educators can say that you should never sound out words, or that you should never do this or that. You can't. If you're getting children at their individual needs, you have to realize that kids learn differently. I feel there is such a friction between the traditional way of doing things and the modern way. And I think there's a balance between the two. I'm finding with some of these kids that there are some I'd love to give centres to. And they could work independently. But the majority of them can't. And if they don't have the basic skills, I'm not going to give them things independently to do that they are struggling with, that I can't teach a group lesson about.

We should not generalize from one beginning teacher to all, but the tensions Nancy describes indicate that having two very different sources of information about teaching can be confusing. Whether beginners can be better prepared to expect and learn from these tensions seems an important empirical question.

Wendy

Wendy is also a first-year teacher, teaching science at the high school level. Her comments stress the differences between settings, between the school, where her practice is situated, and other institutions (university or professional development activity) where ideas are presented. Relating two different forms of knowledge is clearly very difficult for Wendy early in her career.

> I think what they're saying [at the Faculty of Education] is being wasted on first-year teachers. For teachers that are more experienced, it's good to go back and reinforce their idea and get away from the curriculum but, for first-year teachers, it seems to . . . it goes in, it goes out . . . because they get to school and they find out . . . "Jeez, did I really learn anything at [the Faculty of Education]? Because this institution is doing something completely different, and I've got to follow the new rules!" And you forget about what happened back there.

Or at least you can't relate it.

You can't relate it, because we don't have time to think about it. And that's the problem that I find, is that to look back, to go back through all my things from last year that we did. I just haven't had the time. And that was all good stuff! And being able to reflect. And who has . . . you don't have time to reflect! It's really too bad, because it's something you should do. For some people, things come back really easily. For me, I really have to sit and take time to think about what's gone on, and make something of it, whereas [a friend] . . . he just . . . snap, snap, snap . . . he comes up with ideas, no problem!

Or, it looks like that.

It looks like that, anyway! I think if we had more time to **think** about our style of teaching, and to think about what we're giving the kids . . . A good example is professional development days: you get a lot of information, and it sounds so ideal, and then you go back to your old routine. You get the information but you don't implement it.

The tone of comments about professional knowledge and learning from experience changes dramatically when we shift to experienced teachers. Of those who participated in our study, Diane and Roger showed the greatest ability to describe their professional learning in detail.

Diane

Diane has taught at several elementary grade levels from Kindergarten to Grade 8. The data here are taken from interviews during her eleventh year of teaching, her second year at the Grade 1 level. She recalls her early years of teaching, and notes similarities to her present situation at a new grade level. She suggests that sound curriculum packages may have a role in helping teachers relate theory and research to their classroom practices. Her references to invention seem related to learning from experience, and she speaks of her disappointment when someone announces an idea she has been trying, with difficulty, to achieve in her own classroom.

The first few years of teaching, I think, you're trying to get through the day. And I think you have a philosophy in the back of your mind. You have no idea how to put it together with the real life in the classroom. And I *think* that you have to start with getting through from 9-to-4. So, maybe . . . somebody's got to hand you a package? I don't like to say that. I don't suppose the people at [the Faculty of Education] want to say that either. They say, "You go out and invent it." Do you know how long it takes me to invent 9-to-4 five days a week? I think I'm just starting to. I don't know if I'm even inventing now. I think there's another level for me yet.

And what do you think that is?

> When I will come up with that idea that the superintendent has. People come along and they say something and usually I've been thinking that for years! I've always believed that. I just never knew *how* to get from my idea to what was happening. I think that's why I'm enjoying this year so much. My philosophy is right there, in action, and I've never *ever* . . . . And I've been teaching, it seems, a long time and I've taken a lot of courses, I've taken a lot of package courses, you know. I think you've got to give them a good package and whose responsibility is this? The Ministry's? The Faculty's? School boards? Good packages; then, counselling: "Let's think about what we're doing here." Suggestions to go from there so they don't sit on that package.

Also apparent in Diane's comments is the satisfaction of finally reaching a stage at which she is able to move back and forth between ideas and action. In other interviews, she indicated that courses in a Master of Education program helped her to develop this ability, **after** she had become comfortable with the routines of teaching.

Roger[6]

Now in his fifth year of teaching, Roger teaches science in Grade 7 and Grade 8 in a special program for gifted students. Roger's preservice program included a special emphasis on outdoor and experiential education and helped to confirm the personal value he already placed on inquiry and experiential learning. Once he began to teach in a classroom of his own, his students' responses showed him that inquiry-based learning has to be associated with content. If not, he argues, students learn that science is fun but they learn little about the concepts of science. The following statement shows his initial frustration when experience told him that his beliefs were not the complete answer.

> When I came here [to the Faculty of Education], I was very much experiential, very discovery-, inquiry-, process-oriented. And that was great because that was very much the kind of approach and philosophies that were being used here, particularly in science. And when I went to try it, it worked very well. The kids love it and they really enjoy it, but what I noticed was that they were having a lot of fun and they loved science, but they weren't learning anything! And so I began to develop strategies that would deal with that as a side issue. "Yes we'll have some fun, but now we've had some fun, we sort of have to learn some things!" I thought, "This is really stupid. You

---

[6] More extensive discussion of Roger's work, with particular reference to science education, appears in Russell & Munby (in press).

> can't have sort of two parallel approaches to teaching." Anyway, the more I started to read about teaching, and think about it, I really began to look at trying to sort out that dilemma of how is it that people learn so much by *doing* things and yet, when you give kids things to do in science, they don't really learn anything about science other than "science is fun," and "science is enjoyable," and that kind of thing, which is very worthwhile, too.

Roger has provided our most dramatic illustration of success in bringing research to bear on a significant dilemma of practice. When he used the work of Driver (1983) and Barnes (1976) to extend his understanding of what he was attempting, the result was a new set of strategies that enabled him to combine content and inquiry.

> And I guess the thing that really struck me was I read Ros Driver's book, *The Pupil as Scientist?* At first, I was really annoyed with the book because basically what it says is that inquiry is screwed up, [that] kids can't do anything if they don't know anything, and they can't discover anything or plan their own experiments or whatever if they have no background. It was so obvious that it annoyed me; basically, she's saying that inquiry doesn't work. But I didn't want to know it. It was almost as if I believed in it so strongly that there must be a way to make it work. Anyway, the outcome of that book, really, was to lead into the whole "cognitive science" approach to teaching, and looking at how people learn. And I basically got involved in that sort of thing. . . . And that has led to all kinds of reading on top of that, and discovering, actually, now, there are a lot of people who feel that way. Not that the sort of philosophy or the spirit of inquiry is wrong, but just that there has to be some associated content to go with it, and that this can happen in specific ways so that people have some things, some tools to work with when they go to do this experiential kind of thing. So that's what I played with last year, with my kids, and it was dynamite.

Roger's admission that Driver's (1983) arguments annoyed him seems central to understanding his success in relating research to his knowing-in-action. It appears that Roger succeeded in gaining a measure of thoughtful control over his actions, and that he did so by combining learning from experience [inquiry has its limits] with learning from research [inquiry involves both content and process]. Analyses of the concept of inquiry (Driver) and of the nature of group work (Barnes) showed Roger how to reframe the dilemmas of experience. In this instance, the new frame produced new strategies that were better than his initial ones.

Conclusion

This paper draws attention to the unstudied problem of how learning from experience contributes to teachers' development of professional knowledge. Our recognition of the problem arises from research using Schön's (1983) account of professional learning through reflection-in-action to develop case studies of teachers' professional learning. Kennedy's (1987) analysis of four views of expertise in professional programs helps to place Schön's arguments in the broader context of traditions in teacher education. Casting expertise in the domain of deliberate action sets goals that are different from those in programs based on technical skills or theory and general principles. ***Foremost among these goals are greater thoughtful control of action by the professional and greater stimulation of thought by action.***

If we accept the distinction between research knowledge (or, more broadly, propositional knowledge) about teaching and practical knowledge of teaching (knowing-in-action), and if both are seen as significant elements of teachers' professional knowledge, then it is essential to ask how the two interact with each other. Existing traditions of teacher education do not appear to deal directly or formally with learning from and by experience. For the beginning teacher, student teaching experiences and the first year of teaching are major sources of learning how to teach. We know little about the factors that influence the pace and quality of learning that, on the surface, appears to have significant consequences for a teacher's long-term development of professional knowledge. The data selected from interviews with five participants in our study suggest that there are tensions associated with the differences between these two types of professional knowledge. From a very limited data base, the problem is a significant one for first-year teachers. While the tension continues as experience accumulates, comments from two experienced teachers show some level of resolution of the tension, and the case of Roger illustrates significant elements of deliberate action and reflection-in-action.

As we continue to use the perspectives of metaphor and reflection to analyze data from teachers, the relationships of research knowledge and knowing-in-action to each other and to teachers' professional knowledge as a whole are of increasing interest. The topic has significance for future program developments in teacher education and shows considerable potential for both empirical and conceptual research. Such research may also help us to clarify and refine our assumptions about the nature of professional expertise in teaching.

References

Barnes, D. (1976). *From communication to curriculum.* Harmondsworth, England: Penguin Books.

Borko, H., Livingston, C., McCaleb, J., & Mauro, L. (1988). Student teachers' planning and post-lesson reflections: Patterns and implications for teacher preparation. In J. Calderhead (Ed.), *Teachers' professional learning* (pp. 65-83). London: Falmer Press.

Driver, R. (1983). *The pupil as scientist?* Milton Keynes, England: Open University Press.

Feiman-Nemser, S., & Floden, R. E. (1986). The cultures of teaching. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 505-526). New York: Macmillan.

Fenstermacher, G. D. (1986). Philosophy of research on teaching: Three aspects. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 37-49). New York: Macmillan.

Kennedy, M. (1987). Inexact sciences: Professional education and the development of expertise. In E. Z. Rothkopf (Ed.), *Review of research in education 14* (pp. 133-167). Washington, DC: American Educational Research Association.

Munby, H. (1986). Metaphor in the thinking of teachers: An exploratory study. *Journal of Curriculum Studies, 18*(2), 197-209.

Munby, H., & Russell, T. (1989). Educating the reflective teacher: An essay review of two books by Donald Schön. *Journal of Curriculum Studies, 21*, 71-80.

Richardson-Koehler, V. (Ed.). (1987). *Educator's handbook: A research perspective.* New York: Longman.

Russell, T. (1988). From pre-service teacher education to first year of teaching: A study of theory and practice. In J. Calderhead (Ed.), *Teachers' professional learning* (pp. 13-34). London: Falmer Press.

Russell, T., & Johnston, P. (1988, April). *Teachers learning from experiences of teaching: Analyses based on metaphor and reflection.* Paper presented at the meeting of the American Educational Research Association, New Orleans, LA.

Russell, T., & Munby, H. (in press). Science as a discipline, science as seen by students, and teachers' professional knowledge. In R. Millar (Ed.), *Doing science: Images of science in science education.* London: Falmer Press.

Russell, T., Munby, H., Spafford, C., & Johnston, P. (1988). Learning the professional knowledge of teaching: Metaphors, puzzles, and the theory-practice relationship. In P. Grimmett & G. L. Erickson (Eds.), *Reflection in teacher education* (pp. 67-90). Vancouver: Pacific Press & New York: Teachers College Press.

Schön, D. (1983). *The reflective practitioner: How professionals think in action.* New York: Basic Books.

Schön, D. (1987). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions.* San Francisco: Jossey-Bass.

Symposium on Practical Knowledge and Teacher Education. (1987). *Educational Theory, 37*(4), 357-421.